CPNPP Research Program Update and c.

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Overview

- Southwest Chapter of SER
- Restoration Database News
- Developing Research Themes
- Canyonlands Population Genetics Study

Society for Ecological Restoration

Mission— *"to promote ecological restoration as a means of sustaining the diversity of life on Earth and re-establishing a healthy relationship between nature and culture"*

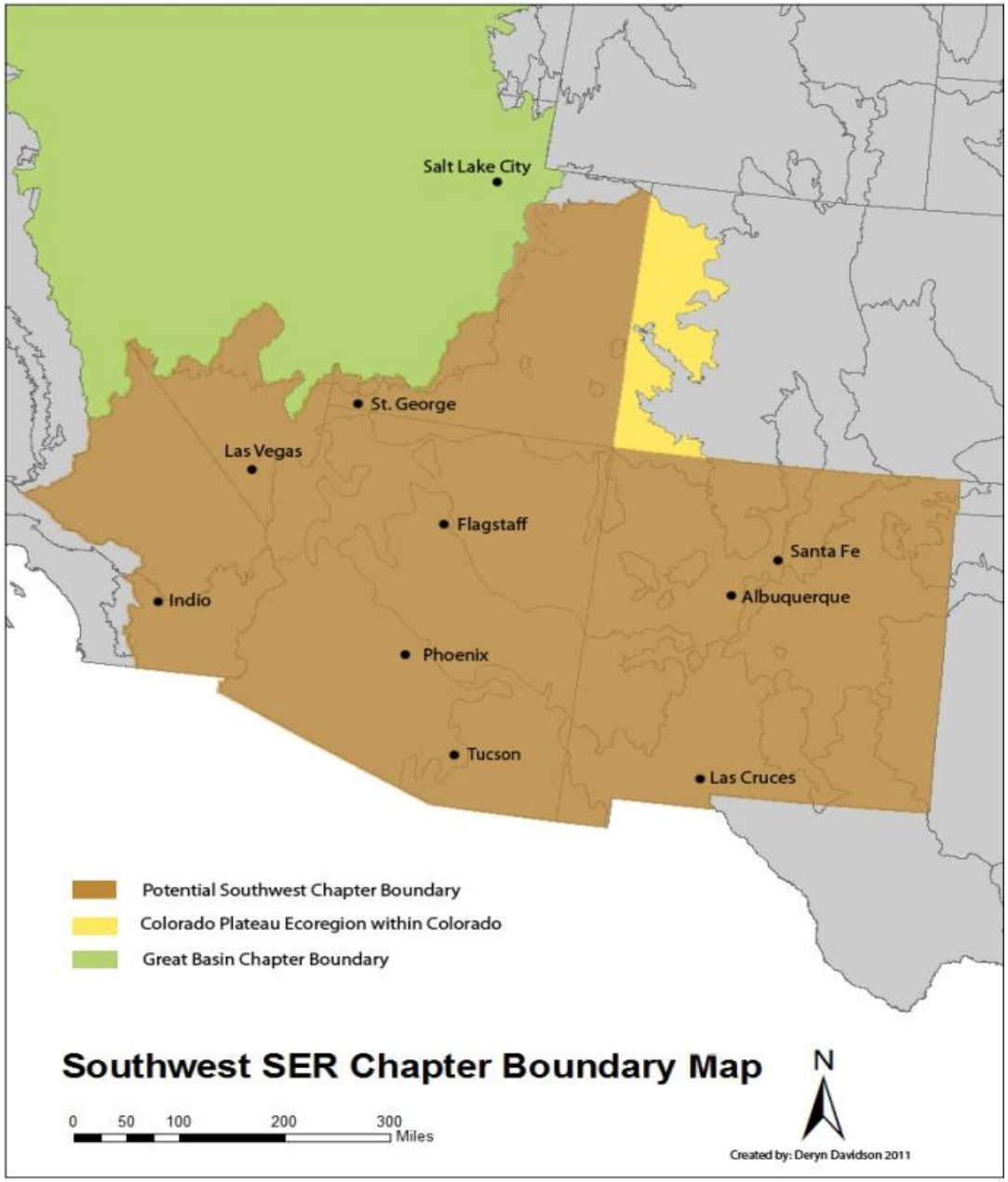
International Organization with > 2000 members
Chapters => Allows Regional Focus

Key goal = bring together land managers, students, practicioners and researchers

Society for Ecological Restoration

Southwest Chapter

Boundary Map



Next Steps…

- Membership (email me)
- Website Development
- First meeting – targeting Fall ’12
- Recruit leadership representative of our geographic/ecologic diversity

Database of Native Plant Restoration on the CP

Search Strategy:

- Centered on Working List of Priority Species
  - Search on binomials, synonyms included
- Web of Science
- Proquest (dissertations and theses)
- Google Scholar (first 100 hits)
- FEIS Bibliography Screen
- General Term Searches (e.g., “seeding and CP”)
- Land Treatment Digital Library (in process)
- Networking
- Focus on CP and species suitable for increase

Results to Date

- Summary/list of key reviews/resources as a starting point (e.g., Monsen et al.)
- Web of Science searches completed for all working list taxa
- Full search completed for highest priority species
- Yields fairly exhaustive Bibliographies
- Bibliographies screened for Most Relevant Studies, i.e., those that contain actionable data
- Synopses of MRS's underway for entry

Data Richness

— 4680 studies identified, expect ca. 7500 (but many duplicates)

studies per species:

Grass (N = 25) $\mu = 93.8$ median = 64

Forb (N = 37) $\mu = 6.9$ median = 2

Woody (N = 44) $\mu = 45.1$ median = 11.5

MRS's at 10-15%

Data Entry Underway

-host at conservationregistry.org

-allows for user input of data

-study sites portrayed spatially

-placed under the CP-CESU “portal”

-will actively recruit user “guinea pigs”

Research Themes/Goals

- Workhorse Grass Selections that are CP-specific
- Characterize Adaptive Differentiation across CP for 5g/5f/5s/w
- “Propagule strips” – high-intensity investment at smaller scale
- Identify competitive annuals (and perennials)
- Exploiting hybridization and its expanded variance
- Outline plan to integrate with SEGA
- Greater integration with academic institutions to encourage students to work on CPNPP priority research

Population Genetics Analysis of Restoration Plant Species in the Canyonlands Region

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and

Meeyoon Choo & Takuya Nakazato
The University of Memphis
Memphis, TN

Mark Miller
National Park Service
Moab, UT

Project Overview

- Examining 3 species: Indian ricegrass, globemallow, sand dropseed

- Empirical Questions:
  - Is there significant genetic variation within the species?
  - If so, how is it structured across the landscape?
  - Are there patterns of covariation between markers and environment?

- <u>How can we use these data to inform restoration at degraded sites within the Parks??</u>

Climate Change and Response of Plant Populations

- Species have 3 potential “choices”:
  - Move (Parmesan 2003)
  - Respond plastically
  - Evolve, i.e. respond genetically (or be moved)

Indian Ricegrass

(courtesy Mark Miller)

–Selfing, perennial, cool season grass

–Early Seral (soil stabilization)

–Broad Ecological Amplitude, e.g., 2–10,000 ft.

–Drought Tolerant

–Cultivars available but lack information on scale of local adaptation across natural pops

Stipa (Achnatherum) hymenoides

Small-flowered Globemallow

-Outcrossing, perennial

-Colonizer, weed-tolerant

-Short-lived = metapopulations

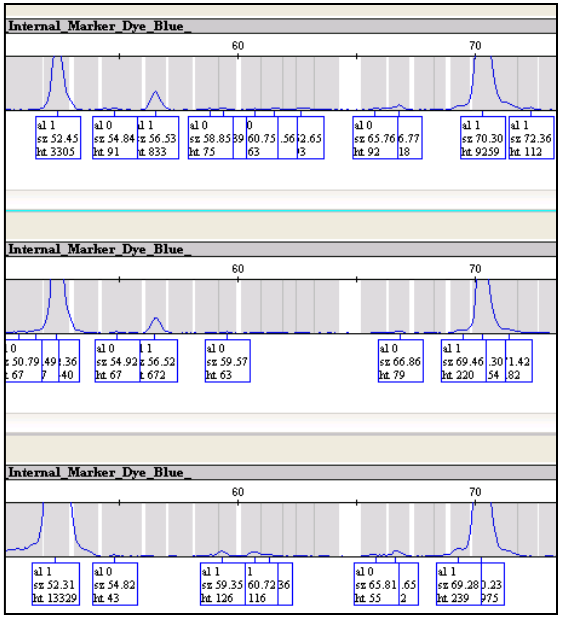
-No official releases

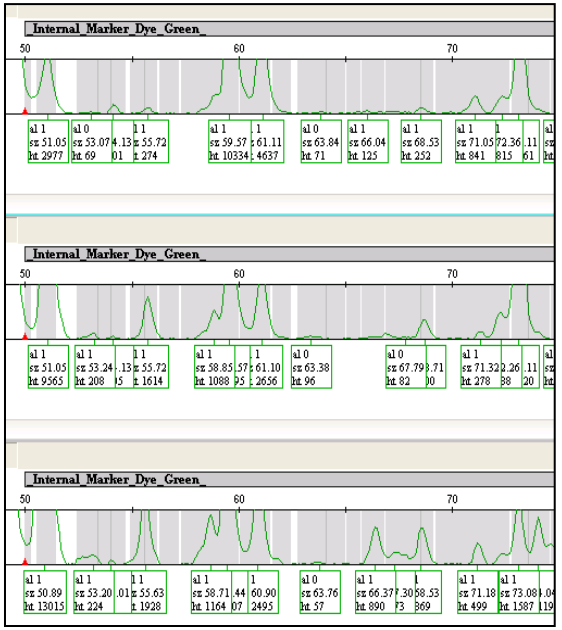
Photo by Mary Moran

Sphaeralcea parvifolia

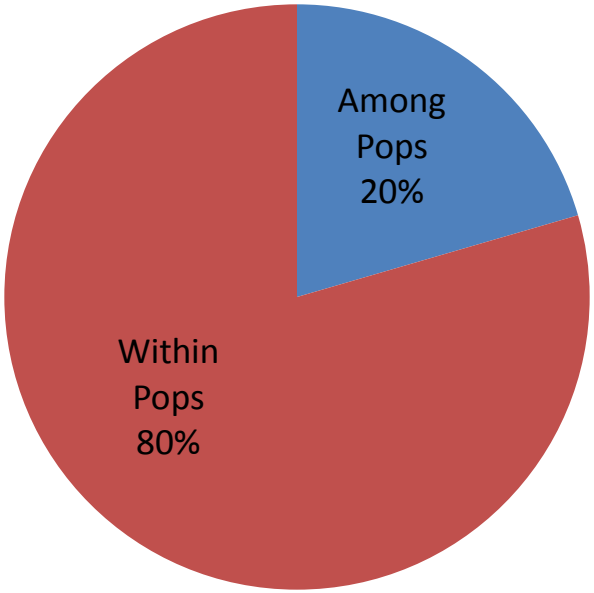
Data set

Taxon	Populations	Individuals	Markers
Indian ricegrass	44	308	266
Sm.fl. globemallow	23	162	309

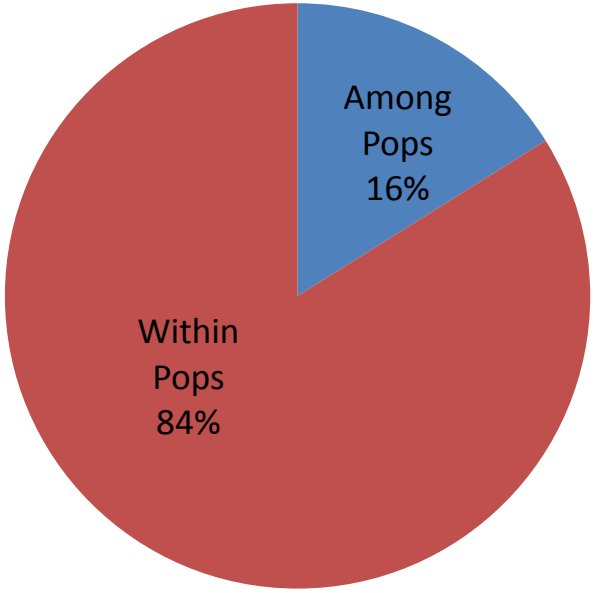




AMOVA Results



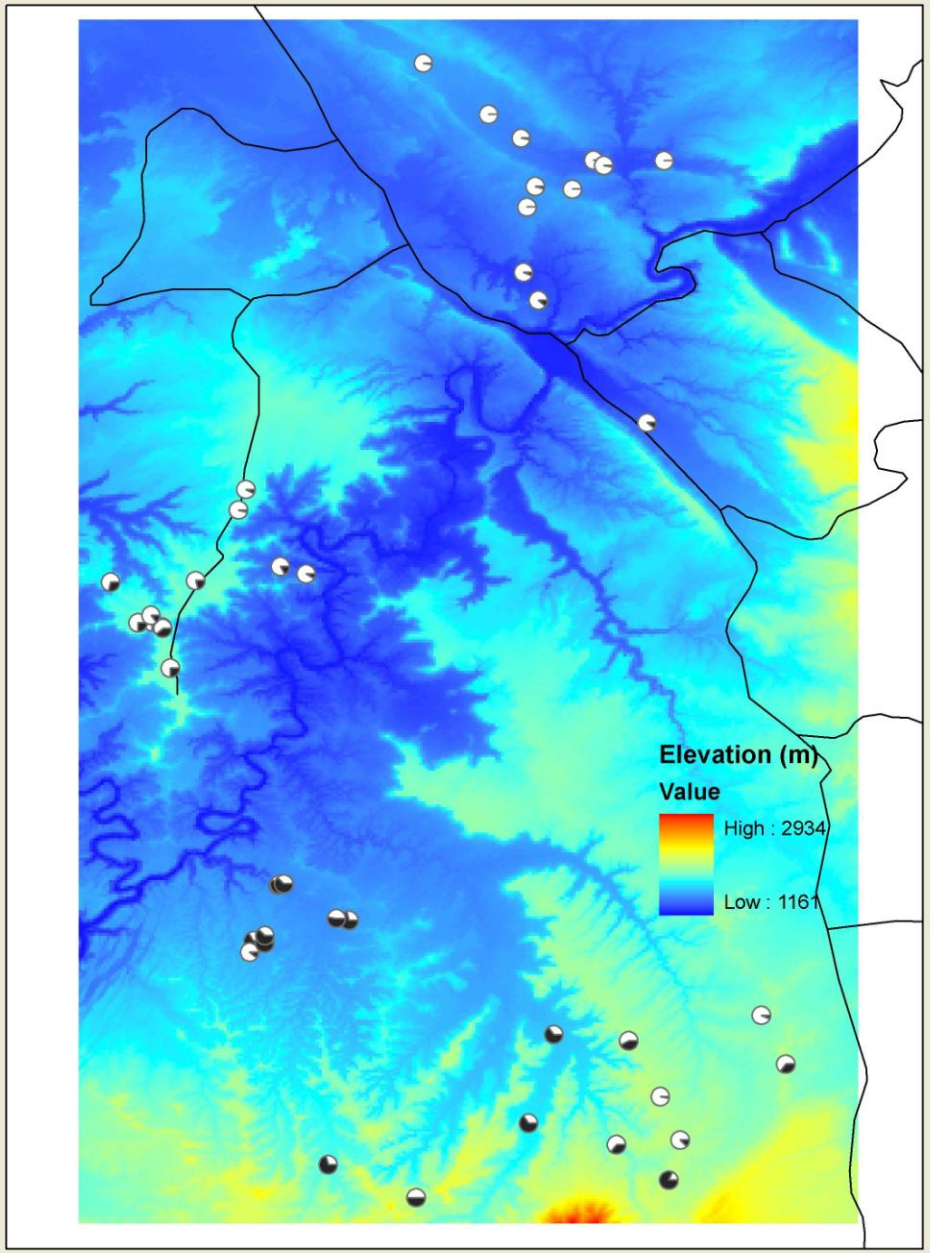
Indian ricegrass



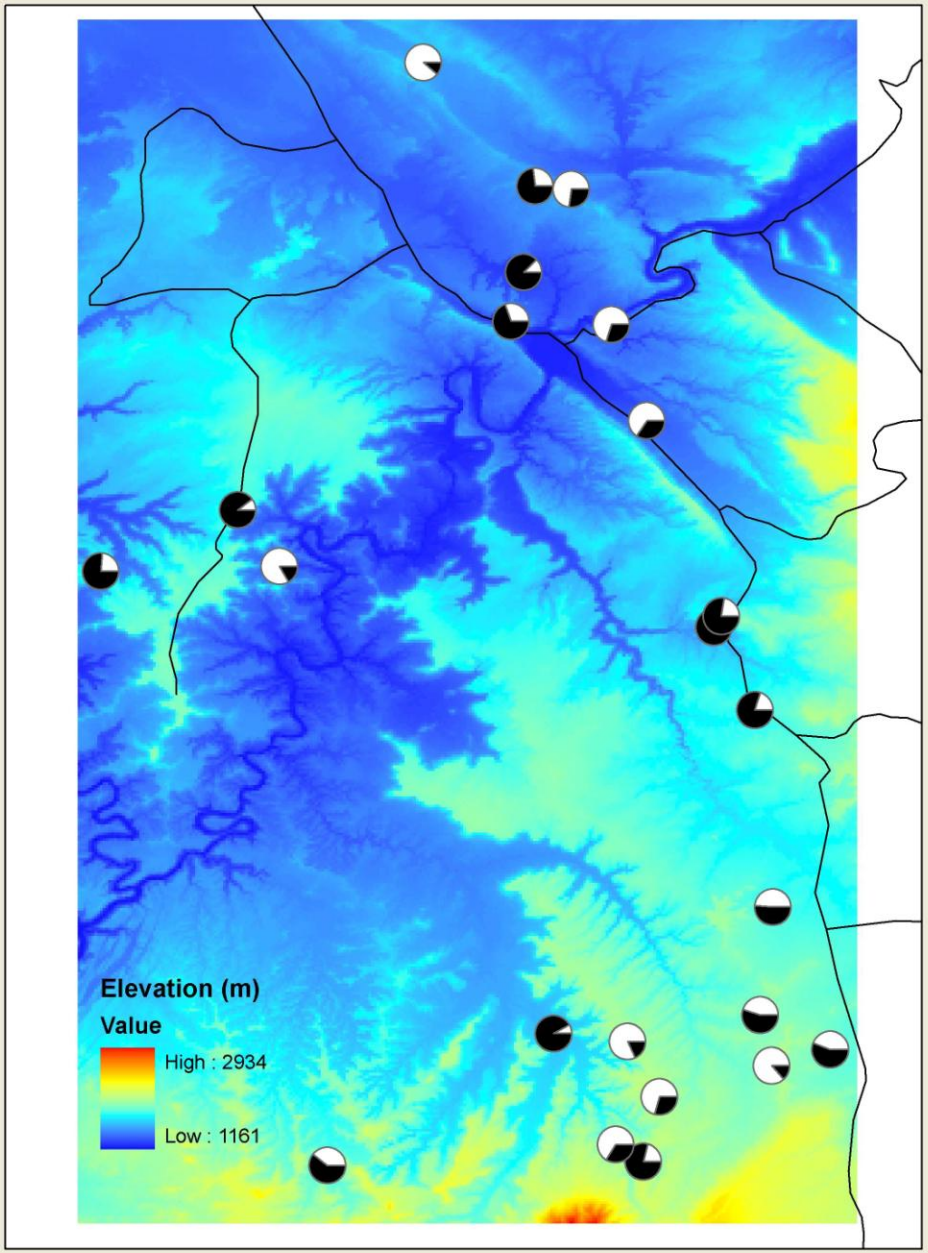
Small-flowered globemallow


70
Crescent Junction
Thompsons Springs
River
128
Devils Garden
Arches
Delicate Arch
191
Colorado
National
The Windows
Park
Moab
191
313
Green
Island in the Sky
(6000 ft.)
Canyonlands
River
Grand View Point
Glen
National
Canyon
River
211
National
Needles
Park
Recreation
Colorado
Area
0
25 miles
0
25 kilometers

Indian ricegrass



Small-flowered globemallow

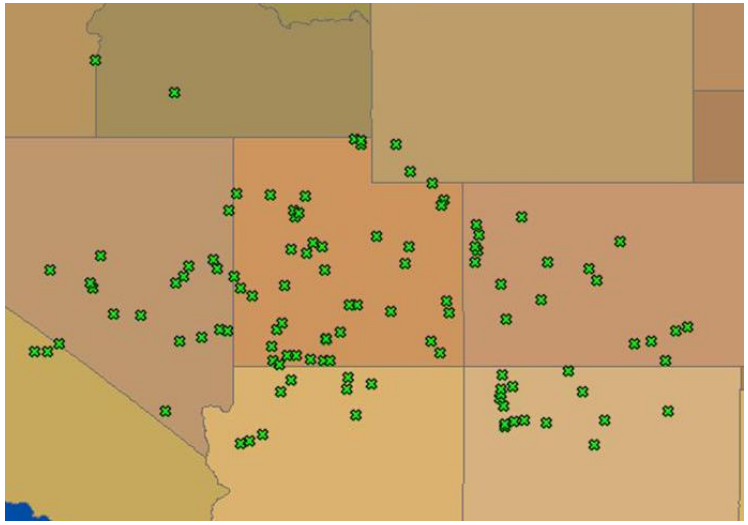


Isolation by Distance

Species	R value	P value
Indian ricegrass	0.203	0.0005
Sm-fl. globemallow	-0.0176	0.426

Broader Analysis of Ricegrass

with RC Johnson and Ted Kisha, USDA ARS



Accessions under evaluation

Two Common Gardens:

–Time to first flower

–Leaf length

–# panicles
–dry weight

Environmental Variables:

–Lat/Long

–Elevation

–Temp/Precip

Accessions typed for 75 AFLP markers, with populations bulk sampled

Summary

- In accordance with other studies, find greater genetic structure in selfing v. outcrossing
- The pattern in ricegrass may be the result of drift or selection
- Next step is to see if allele frequency variation is explained by elevation

Acknowledgements

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